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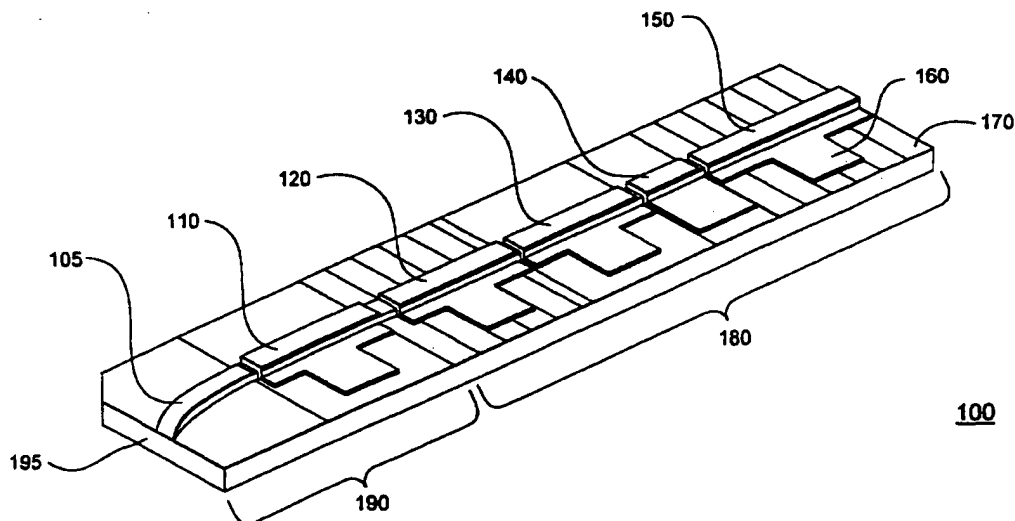
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| 09/614,375 | 12 July 2000 (12.07.2000) | US | 09/614,195 (CIP) |
| 09/614,865 | 12 July 2000 (12.07.2000) | US | 09/614,375 (CIP) |
| 09/614,224 | 12 July 2000 (12.07.2000) | US | 09/614,865 (CIP) |
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[Continued on next page]

(54) Title: **TUNABLE LASER SOURCE WITH INTEGRATED OPTICAL AMPLIFIER**



(57) Abstract: A laser assembly includes an epitaxial structure formed on a substrate. A separately controllable tunable laser resonator and external optical amplifier are formed in the epitaxial structure. At least a portion of the laser and amplifier share a common waveguide, which may have non-uniform optical or geometrical properties along the waveguide centerline or across a normal to the centerline.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01S5/0625 H01S5/026

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 715 268 A (LANG ROBERT J ET AL) 3 February 1998 (1998-02-03) column 5, line 60 -column 7, line 10; figure 3	1,77,88, 99,131 44
X A	US 5 088 105 A (STREIFER DECEASED WILLIAM ET AL) 11 February 1992 (1992-02-11) column 6, line 11 -column 7, line 8; figure 3	1,6-9, 13,18, 77,99, 131 44,88



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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- *Z* document member of the same patent family

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	LEE S -L ET AL: "SAMPLED GRATING DBR LASER ARRAYS WITH ADJUSTABLE 0.8/1.6- μ M WAVELENGTH SPACING" IEEE PHOTONICS TECHNOLOGY LETTERS, IEEE INC. NEW YORK, US, vol. 11, no. 8, August 1999 (1999-08), pages 955-957, XP000860962 ISSN: 1041-1135 the whole document ---	1, 44, 77, 88, 99, 131
A	VIJAYSEKHAR JAYARAMAN ET AL: "THEORY, DESIGN, AND PERFORMANCE OF EXTENDED TUNING RANGE SEMICONDUCTOR LASERS WITH SAMPLED GRATINGS" IEEE JOURNAL OF QUANTUM ELECTRONICS, IEEE INC. NEW YORK, US, vol. 29, no. 6, 1 June 1993 (1993-06-01), pages 1824-1834, XP000397620 ISSN: 0018-9197 the whole document ---	1, 44, 77, 88, 99, 131
A	GB 1 539 028 A (TOKYO INST OF TECH) 24 January 1979 (1979-01-24) figures 8-11 ---	44
A	EP 0 620 475 A (CANON KK) 19 October 1994 (1994-10-19) figure 16 -----	44

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/22816

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5715268 A	03-02-1998	NONE	
US 5088105 A	11-02-1992	NONE	
GB 1539028 A	24-01-1979	NONE	
EP 0620475 A	19-10-1994	JP 6265958 A	22-09-1994
		JP 7045860 A	14-02-1995
		JP 7146456 A	06-06-1995
		JP 3104831 B	30-10-2000
		JP 7202343 A	04-08-1995
		DE 69415576 D	11-02-1999
		DE 69415576 T	17-06-1999
		US 5613020 A	18-03-1997

